

# **DS42 Inverter Rotary Vane Pumps**

Model:

X3700-60000

# Notice de Mode D'Emploi User Manual

87-900-140-01 (A) 11/2013



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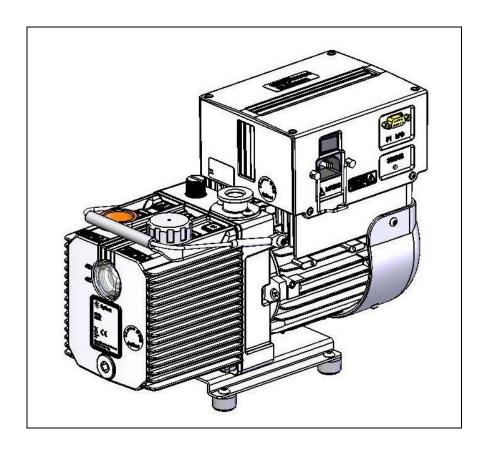
### CAUTION

A **CAUTION** notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in damage to the product or loss of important data. Do not proceed beyond a **CAUTION** notice until the indicated conditions are fully understood and met.

### WARNING

A WARNING notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in personal injury or death. Do not proceed beyond a WARNING notice until the indicated conditions are fully understood and met.

# **DS42 Inverter Rotary Vane Pumps**



### **DS42 Inverter Rotary Vane Pumps**

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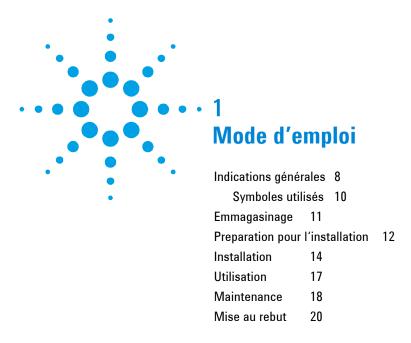
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Traduction de la mode d'emploi originale



### 1 Mode d'emploi Indications générales

### Indications générales

Cet appareil a été conçu en vue d'une utilisation professionnelle. Il est conseillé à l'utilisateur de lire attentivement cette notice ainsi que toute autre information fournie par Agilent avant de l'utiliser. Agilent décline toute responsabilité en cas de non-respect total ou partiel des instructions fournies, d'utilisation in-correcte de la part du personnel non formé, d'opérations non autorisées ou d'un emploi contraire aux réglementations nationales spécifiques.

Les DS42 Inverter Rotary Vane Pumps sont des pompes rotatives à deux étages étages, à palettes, étanches en bain d'huile, actionnées par un moteur électrique triphasé. Ces pompes à haut vide sont adaptées au pompage de gaz non corrosifs.

Les paragraphes suivants fournissent toute l'information nécessaire pour garantir la sécurité de l'opérateur pendant l'utilisation de l'appareil. Des ren-seignements plus détaillés se trouvent dans l'appendice «Technical Information».

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### Cette notice utilise les signes conventionnels suivants:



AVERTISSEMENT! Les messages d'avertissement attirent l'attention de l'opérateur sur une procédure ou une manœuvre spéciale dont la mauvaise exécution risque de provoquer de graves lésions.

ATTENTION!

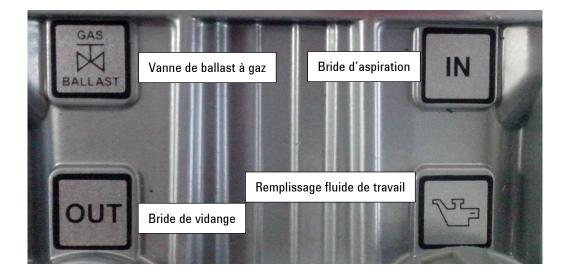
Les messages d'attention apparaissent avant certaines procédures dont le nonrespect pourrait endommager sérieusement l'appareil.

NOTE

Les notes contiennent des renseignements importants, isolés du texte.

# Symboles utilisés

Les symboles suivants sont utilisés dans toutes les illustrations:



# **Emmagasinage**

Pendant le transport et l'emmagasinage des pompes, veiller à respecter les conditions environnementales suivantes:

- température: de -20 °C à +70 °C
- humidité relative: 0 95 % (sans condensation)

### **Preparation pour l'installation**

La pompe est fournie dans un emballage de protection spécial; si l'on constate des marques de dommages pouvant s'être produites pendant le transport, contacter aussitôt le bureau de vente local.

Le poids total de l'emballage avec la pompe est d'environ 13 kg maximum.

Pendant l'opération d'ouverture de l'emballage, veiller tout particulièrement à ne pas laisser tomber la pompe et à ne lui faire subir aucun choc ni aucune vibration.

Ne pas jeter l'emballage dans la nature. Le matériel est entièrement recyclable et il est conforme à la directive CEE 85/399 en matière de protection de l'environnement.

### NOTE

La pompe ne peut être endommagée en restant simplement exposée à l'atmosphère. Il est de toute façon conseillé de la garder dans son emballage jusqu'au moment de sa mise en place sur le système afin d'éviter toute pollution due à la poussière.

### NOTE

La pompe est équipée de certains accessoires standard:

- 1 cable de Entrée/Sortie (I/O)
- Ressort de maintien pour prise IEC320
- 1 cable d'extension IEC320



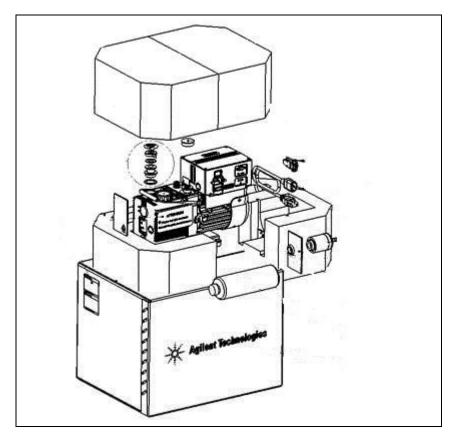


Figure 1

### Installation

Ne pas installer et/ou utiliser la pompe dans des milieux exposés aux agents atmosphériques (pluie, gel, neige), à des poussières, à des gaz agressifs ainsi que dans des milieux explosifs ou à risque élevé d'incendie.

Pendant le fonctionnement, il est nécessaire de respecter les conditions environnementales suivantes:

- Température: de +12 °C à +40 °C
- Humidité relative: 0 95 % (sans condensation)



AVERTISSEMENT! Pour protéger contre les court-circuits ou les surintensités, il faut installer un disjoncteur automatique sur la ligne d'alimentation principale vers les dispositifs Agilent, de 10A de capacité.

ATTENTION!

Garantissez la présence d'un espace libre de 20 cm minimum autour de la pompe pour permettre une libre circulation de l'air.

ATTENTION!

Avant toute utilisation de la pompe, vérifier le niveau de l'huile.



AVERTISSEMENT! Avant toute autre opération, retirer les bouchons de protection placés sur les brides d'aspiration et de vidange. En cas de mise en marche inopinée de l'appareil, l'air contenu à l'intérieur de la pompe peut les projeter contre l'opérateur et le blesser.

### AVERTISSEMENT!



Pendant l'installation, faire très attention à ce que la bride d'aspiration soit reliée à la chambre à vider et que la bride de vidange ne soit pas bouchée (voir la figure ci-après). La pompe ne doit pas être utilisée comme un compresseur. La pression maximale à l'intérieur du réservoir d'huile ne doit pas dépasser 1,5 bar (abs). Le non-respect de ces précautions peut entraîner un danger pour l'opérateur et endommager la machine.

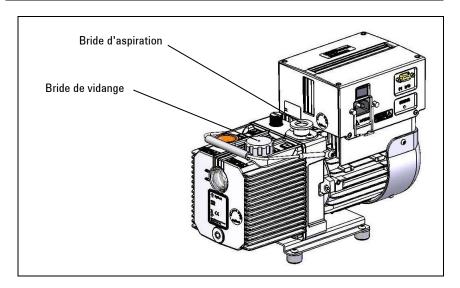


Figure 2

# 1 Mode d'emploi Installation

### ATTENTION!

Contrôler que la tension d'alimentation correspond à la gamme de tensions indiquées sur la plaquette du contrôleur.

Brancher la pompe à la source d'alimentation.

### **Utilisation**

La mise en marche de la pompe ne requiert aucune manœuvre particulière; il suffit de la brancher à l'alimentation électrique et d'actionner l'interrupteur bipolaire.



AVERTISSEMENT! La pompe a été conçue pour fonctionner avec des fluides neutres ou non corrosifs. L'emploi de substances potentiellement explosives ou inflammables est strictement interdit.

### Maintenance

Le personnel chargé de la conduite et de la maintenance de la pompe doit avoir la formation nécessaire et posséder une connaissance approfondie des normes de prévention des accidents du travail.



AVERTISSEMENT! Les hautes tensions peuvent entraîner la mort par contact. Veiller à toujours opérer avec le maximum de prudence et dans le respect des normes de prévention des accidents du travail en vigueur.

### AVERTISSEMENT!



Lorsque la machine est sous tension, faire attention à la présence d'organes en mouvement et de haute tension.



AVERTISSEMENT! En cas de nécessité de procéder à des opérations de maintenance de la pompe au terme d'une période de fonctionnement, il est indispensable de la laisser refroidir car sa température extérieure peut être supérieure à 60 °C.



AVERTISSEMENT! Avant toute opération de maintenance, il est impératif de toujours couper l'alimentation de la pompe. Placer les panneaux spécifiques d'avertissement: APPAREIL EN COURS DE MAINTENANCE – NE PAS BRANCHER L'ALIMENTATION, près de l'interrupteur d'alimentation. Au terme des opérations de maintenance, restaurer les dispositifs de sécurité.

### AVERTISSEMENT!



Ne pas effectuer la substitution d'huile immédiatement après l'arrêt de la machine car la température de celle-là peut être élevée.

### NOTE

Avant de retourner une pompe au constructeur pour réparation, il est indispensable de remplir et d'adresser au bureau local de vente la fiche "Health and Safety Certification" jointe à la présente notice. Une copie de celle-ci devra être mise dans l'emballage de la pompe avant expédition.

En cas de mise au rebut de la pompe, procéder à son élimination conformément aux réglementations nationales en la matière.

### Mise au rebut

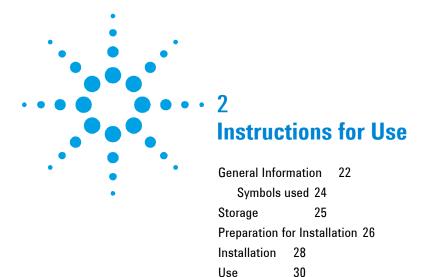
### Signification du logo "WEEE" figurant sur les étiquettes.

Le symbole ci-dessous est appliqué conformément à la directive CE nommée "WEEE".

Ce symbole (uniquement valide pour les pays de la Communauté européenne) indique que le produit sur lequel il est appliqué NE doit PAS être mis au rebut avec les ordures ménagères ou les déchets industriels ordinaires, mais passer par un système de collecte sélective.

Après avoir vérifié les termes et conditions du contrat de vente, l'utilisateur final est donc prié de contacter le fournisseur du dispositif, maison mère ou revendeur, pour mettre en œuvre le processus de collecte et mise au rebut.





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Disposal

### **General Information**

This equipment is destined for use by professionals. The user should read this instruction manual and any other additional information supplied by Agilent before operating the equipment. Agilent will not be held responsible for any events occurring due to non-compliance, even partial, with these instructions, improper use by untrained persons, non-authorized interference with the equipment or any action contrary to that provided for by specific national standards.

The DS42 Inverter Rotary Vane Pumps are double-stage, rotary vane pumps oil sealed, driven by a three-phase electric motor. These high vacuum pumps are suitable for pumping non corrosive gases.

The following paragraphs contain all the information necessary to guarantee the safety of the operator when using the equipment. Detailed information is supplied in the appendix "Technical Information".

### This manual uses the following standard protocol:

WARNING!



The warning messages are for attracting the attention of the operator to a particular procedure or practice which, if not followed correctly, could lead to serious injury.

**CAUTION!** 

The caution messages are displayed before procedures which, if not followed, could cause damage to the equipment.

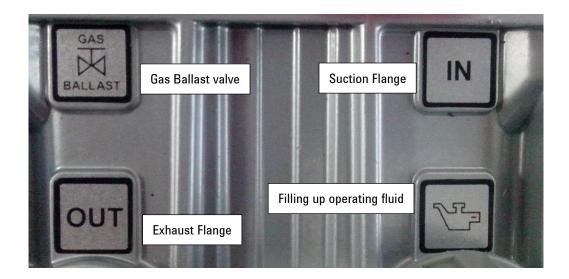
NOTE

The notes contain important information taken from the text.

### 2 Instructions for Use General Information

# Symbols used

The following symbols are used consistently throughout in all illustration:



# **Storage**

When transporting and storing the pumps, the following environmental requirements should not be exceeded:

- temperature: from -20° to +70 °C
- relative humidity: 0 95 % (non-condensing)

### **Preparation for Installation**

The pump is supplied in a special protective packing. If this shows signs of damage which may have occurred during transport, contact your local sales office.

Total weight of the pack, including the pump, is approx. 13 Kg.

When unpacking the pump, be sure not to drop it and avoid any kind of sudden impact or shock vibration to it.

Do not dispose of the packing materials in an unauthorized manner. The material is  $100\,\%$  recyclable and complies with EEC Directive 85/399.

NOTE

Normal exposure to the environment cannot damage the pump. Nevertheless, it is advisable to keep it closed until it is installed in the system, thus preventing any form of pollution by dust.

NOTE

The pump is provided with some standard accessories:

- 1 I/O cable
- IEC320 retention spring
- 1 extension cable IEC320

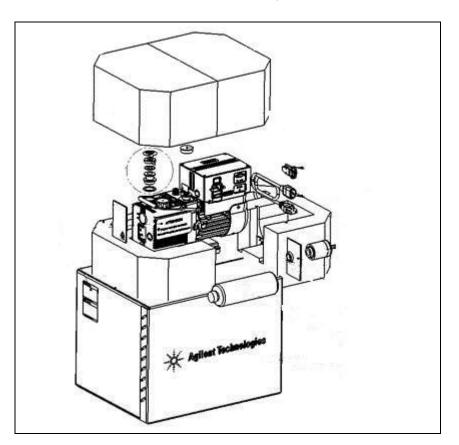


Figure 1

### Installation

Do not install or use the pump in an environment exposed to atmospheric agents (rain, snow, ice), dust, aggressive gases, or in explosive environments or those with a high fire risk. During operation, the following environmental conditions must be respected:

- temperature: from +12 °C to +40 °C
- relative humidity: 0 95 % (non-condensing).

### **WARNING!**

Protect against short circuits and overload by installing on Agilent Device electrical main line an automatic circuit breaker of 10A capacity.



CAUTION!

Assure a free space all around the pump at minimum of 20cm to allow proper air circulation.

CAUTION!

Before starting the pump, check the oil level.

### WARNING!



Take out the protective caps on the suction and exhaust flanges before doing anything else. In the event of an accidental start-up, the air inside the pump could violently expel the protective caps and harm the operator.

### **WARNING!**



During installation, pay maximum attention that the suction flange is connected to the vacuum chamber and the exhaust flange is not closed (see the following figure). The pump must not be used as a compressor. Maximum pressure inside the oil container must not exceed 1.5 bar (abs.). Non-observance of these precautions may be dangerous for the machine and the operator.

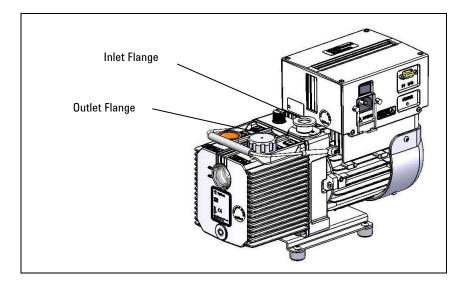


Figure 2

### CAUTION!

Check that your electrical mains voltage corresponds to the range indicated on controller label.

Connect the pump to the power supply.

# 2 Instructions for Use Use

### Use

There are no special procedures for switching the pump on; it needs only to be connected to the electric power by means of the bipolar switch.

### WARNING!



The pump is designed for operation with neutral or non-corrosive fluids. It is absolutely forbidden to use potentially explosive or flammable substances.

### **Maintenance**

Personnel responsible for pump operation and maintenance must be well-trained and must be aware of the accident prevention rules.

### WARNING!

Death may result from contact with high voltages. Always take extreme care and observe the accident prevention regulations in force.



WARNING!

When machine is powered take care on account of moving parts and high voltages.



### WARNING!



If you have to perform maintenance on the pump after a considerable time in operation, leave it to cool as temperature of the outer surface may be in excess of 60  $^{\circ}$ C.

### **WARNING!**



Always disconnect the power supply to the pump before starting maintenance work. Place a special warning signs over the power supply breaker switch: MACHINE UNDERGOING MAINTENANCE - DO NOT POWER ON. When finished, remove the safety warning.

### WARNING!

Do not change the oil immediately after stopping the machine as the oil temperature may still be high.



NOTE

Before returning the pump to the constructor for repairs the "Health and Safety Certification" sheet attached to this instruction manual must be filled-in and sent to the local sales office. A copy of the sheet must be inserted in the pump package before shipping.

If a pump is to be scrapped, it must be disposed of in accordance with the specific national standards.

### **Disposal**

### Meaning of the "WEEE" logo found in labels

The following symbol is applied in accordance with the EC WEEE (Waste Electrical and Electronic Equipment) Directive. This symbol (valid only in countries of the European Community) indicates that the product it applies to must NOT be disposed of together with ordinary domestic or industrial waste but must be sent to a differentiated waste collection system.

The end user is therefore invited to contact the supplier of the device, whether the Parent Company or a retailer, to initiate the collection and disposal process after checking the contractual terms and conditions of sale.



2 Instructions for Use Disposal



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## Section I

## **Technical Description**

The DS42 Inverter Rotary Vane Pumps are rotary vane pumps oil sealed, driven by a three-phase electric motor.

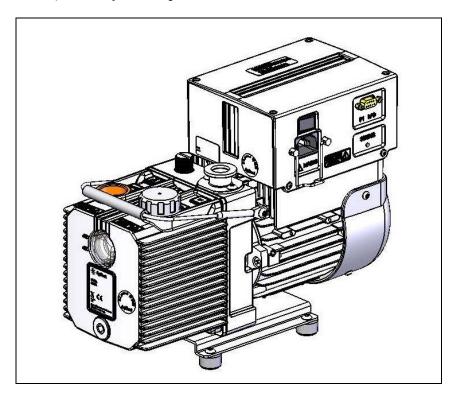


Figure 3

These vacuum pumps are suitable for pumping non corrosive gases.

The main features are:

- all parts in direct contact with the fluid pumped are free of copper alloys;
- all materials are carefully selected to provide extended life;

### 3 Technical Information Technical Description

 due to its design features and low number of gaskets, the pump requires little maintenance, disassembly and reassemble are easy and require minimal time.

The oil guarantees perfect sealing of the discharge valves, enters the pump to ensure lubrication and sealing of the parts inside, facilitates heat dissipation and reduces pump noise.

The pump is equipped with a special anti-suckback device which automatically isolates the vacuum system when the pump stops. This avoids rises in pressure or oil flow in the vacuum system while air is allowed back into the stator chambers.

The air entering the pump after the anti-suckback device has closed prevents the oil in the casing from filling the stator chambers.

## **Vacuum Seals**

A special feature of this pump is the low number of gaskets that are employed.

The seals in the circuit are obtained by means of VITON gaskets.

Sealing of the rotor shaft is guaranteed by a rotating gasket with dust-guard lip.

The suction flange and duct are sealed by mean of OR gaskets.

## **Anti-Suckback Device**

The pump is equipped with a special anti-suckback device to avoid air pressure rises and/or oil back-flow towards the evacuated vessel when the pump is switched off.

The device includes some special features, namely:

drive obtained avoiding any form of contamination of the inlet duct by fluids (oil and/or air). Thanks to this, when the pump is started again, the pumpdown to vacuum conditions is extremely fast as these contaminants are not present and no degassing is therefore required.

## **Technical Data**

Th The following table lists the main technical data of the DS42 Inverter Rotary Vane Pumps.

Tab. 1

TECHNICAL DATA	Hz	Units	Value
FREE AIR DISPLACEMENT	50	I/min (m³/h)	38 (2.3)
PUMPING SPEED	50	m³/h	1.8
ULTIMATE PARTIAL PRESSURE *		mbar	10 <sup>-4</sup> Range
ULTIMATE TOTALE PRESSURE *		mbar	4x10 <sup>-3</sup>
ULTIMATE TOTALE PRESSURE WITH GAS BALLAST*		mbar	2x10 <sup>-2</sup>
WATER VAPOR TOLERANCE		mbar	15
WATER VAPOR CAPACITY		g/h	60
OIL CAPACITY min/max		1	0.6
OIL TEMPERATURE		°C	60
(pump operating) **		°F	140
Installation category			II
Pollution degree			2
OPERATING TEMPERATURE RANGE		°C	12 – 40
WEIGHT		Kg	13
		lb	28
INLET FLANGE		DN	16
EXHAUST FLANGE		DN	16
Internal use Only			
Max Altitude 2000m			
Input Voltage	50-60	V	100-240 +/-10%

<sup>\*</sup> According to PNEUROP 6602

<sup>\*\*</sup> At ultimate total pressure, 20 °C (68 °F) room temperature

## **Dimensions**

The following figure shows the pumps layout and dimensions:

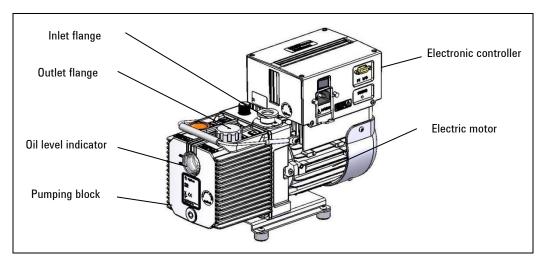


Figure 4 DS42 Inverter Rotary Vane Pumps layout

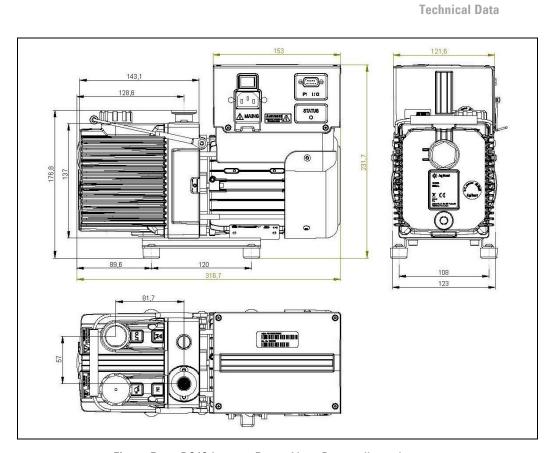


Figure 5 DS42 Inverter Rotary Vane Pumps dimensions

## **Safety Precautions**

- Always carry the pump by means of the ring-bolt provided.
- The pump must be set in position taking the upmost care in order to avoid accidental falls.

### WARNING!



In case of a need to handle the pump after a period of operation, it must be left to cool first as the external surface temperature may be in excess of  $60\,^{\circ}\text{C}$ .

## **Transport and Installation**

The pumps are shipped to the customer inside cardboard boxes.

Total weight of the pack, including the pump, is about 17 Kg.

The case must be handled with care, using appropriate lifting equipment.

CAUTION!

When moving the case, ensure that it is securely bound to the lifting equipment and that the equipment is strong enough to support the weight.

The pump's working environment is a traditional industrial environment. Naturally sites with corrosive vapors or excessive heat are best avoided.

Room temperature should ideally be between 12 °C and 40 °C.

If the temperature is not inside this range, consult Agilent technical service for the changes required.

### 3 Technical Information Transport and Installation

Setting the pump in position should be performed as follows:

- Pump laid on the ground. There are no special instructions for this type of installation, except that the floor should be as flat as possible and suited to bear the weight of the pump (it should ideally be a concrete floor) and of any accessories mounted on it. Note that the pump is stable on its base plate and it should not be necessary to anchor it to the floor with bolts and screws; also vibrations to and from the pump are greatly reduced by the use of rubber feet.
- Pump off the ground. In this case, the user must design a suitable support structure, remembering the following points:
  - the plane supporting the pump must be perfectly horizontal;
  - the structure should be adequately rigid;
  - the relevant safety precautions should be applied.

Note also that the pump should be attached to the supporting structure after replacing the rubber feet with special anti-vibration feet, which should be screwed to the pump base and to the supporting plane.

After taking the pump out of its packing case, you are advised to make the following checks:

- **a** Ensure that the pump has not suffered any damage during shipping.
- **b** Check that there are no uncovered or loose parts.

## **Preliminary Operations**

Before starting the pump, check for oil level.

CAUTION!

Oil must be poured into the casing through the special threaded plughole and NOT through the suction line.

### WARNING!



Take out the protective caps on the suction and exhaust flanges before doing anything else. In the event of an accidental start-up, the air inside the pump could violently expel the protective caps and harm the operator.

## **Section II**

## **Connection to the Electric Supply**

### CAUTION!

It is recommended to connect the pump to the power supply through a dedicated safety switch on the main electrical panel of the installation, or in proximity of the power supply connection point.

### **WARNING!**

The pump must be installed in a way that allows an easy interruption of the line voltage.



Power supply cord: The correct cable for electrical wiring is a three wires (Ph+N+Earth) cable. The wire section has to be at least 0.75 mm2 (AWG18).

## **Connections to the Inlet and Exhaust Flanges**

Remove the protective caps from both flanges. Connect the system to be evacuated to the inlet flange, using a centering ring with OR and a locking collar.

#### NOTE

For guaranteed reliable sealing, use an OR gasket in Perbunan or Viton.

The inlet duct is equipped with a sieve filter preventing solid particles from entering and damaging the pump.

#### NOTE

When the gases to be pumped out contain dust, it is advisable to insert a dust filter before the inlet flange.

NOTE	When the gases to be pumped out contain large quantities of vapor, it is advisable to include a condense separator before the inlet flange.
	To make best use of the pump's capacity, use only short, straight piping, with a diameter not smaller than that of the inlet flange.
NOTE	If rigid piping is used, it is good practice to use a flexible joint in order to avoid undue forcing of the connection on the pump.
	The exhaust duct must be connected to a pipe that will take away the pumped out gases.
NOTE	An internal oil mist eliminator avoids pollution of the surrounding atmosphere by the oil present in the exhaust duct during pump operation.
CAUTION!	Never block the pump exhaust line. This would cause overpressure in the casing with the risk of breaking the oil tank.

## **Starting and Running the Pump**

### WARNING!

The pump is designed for operation with neutral or non-corrosive fluids. It is absolutely forbidden to use potentially explosive or flammable substances.



NOTE

If the pump is started with cold oil, initially more than normal noise will be heard; this will last for a few minutes only until the oil reaches its working temperature.

There are no special instructions for normal operation of the pump, which is delivered to you after completion of a running or cycle in the factory.

NOTE

To allow the pump starting you have to wire properly the interlock pins by connecting the mating connector provided with the pump.

NOTE

For repetitive work cycles, with brief time intervals in between, it is better not to stop the pump.

## **Stopping the Pump**

There are no special procedures for switching the pump off; it needs only to be disconnected from the electric power by means of the bipolar switch. When the pump is stopped, the anti-suckback device makes it possible to maintain vacuum in the vessel connected on the inlet flange of the pump.

## **Safety Rules**

Personnel responsible for pump operation and maintenance must be well-trained and must be aware of the accident prevention rules. The accident prevention precautions contained in this section must be respected at all times during operation and maintenance of the pump to avoid damage to operators and to the pump. These precautions are provided in the form of WARNING and CAUTION notes.

### **WARNING!**

Operating procedures, technical information and precautions which, if not respected and/or implemented correctly may cause body harm to operators.



Before connecting the IEC320 mains cable, install the Retention Spring provided with the MS40+. The Retention Spring has to be fastened to IEC320 connector lateral screws.

NOTE

Use the Retention Spring to secure the mains cable into the IEC320 socket.

**CAUTION!** 

Operating procedures, technical information and precautions, which, if not respected and/or implemented correctly, may cause damage to the pump.

## **Warning Notes**

- a Death may result from contact with high voltages. Always take extreme care and observe the accident prevention regulations in force.
- b Always disconnect the power supply to the pump before maintenance work. Place a special warning signs over the power supply breaker switch: MACHINE UNDERGOING MAINTENANCE - DO NOT POWER ON.
- c If you are performing maintenance after the pump has been operating for a considerable time, allow sufficient time for it to cool as the external surface temperature may be in excess of 60 °C.
- d Failure to provide the pump with an earth connection may cause serious damage to operators. Always ensure that there is an earth connection and that it complies with the standards.
- e When cleaning the pump and its component parts, avoid the use of flammable or toxic solvents, such as benzin, benzol, ether or alcohol. The recommendation is to use a soap and water solution, preferably in ultrasound washing machines, taking care to dry all the cleaned parts at temperatures under 100 °C in order to eliminate residual moisture.
- Prolonged overloads or breakdowns may cause the electric motor to overheat, and to release noxious smoke; remove the power immediately as a precaution and do not approach the pump at least until you have provided ventilation to drive out the smoke. Take care not to breathe in the fumes remaining inside the pump in the course of repair work.
- g In case of fire, do not throw water on the pump. Switch the power off and use CO<sub>2</sub> extinguishers.
- h Carefully inspect the flanges to ensure that there is no dust, oil, dirt or defects of the mating surfaces, before making the required connections.
- i Ensure that all joints and couplings are locked correctly before starting the pump again after repair work.

# 3 Technical Information Warning Notes

- j Do not wear any objects that may become entangled in the mechanisms and/or act as conductors (chains, bracelets, etc.).
- k Ensure that the tools to be used are in perfect working condition and have insulating grips, where necessary. Check that the insulating material of the cables and that the conductors of the test equipment do not show any signs of damage.
- I Do not replace the oil immediately after stopping the machine as the oil may still be at high temperature.
- Perform repairs in clean and, where possible, dustfree areas. Protect all the clearances of connection points with suitable plastic caps and cover the machined surface areas of all parts stripped down until they are put back on the pump again.

## **Caution Notes**

- **a** Before putting the pump back into operation after a breakdown, inspect it and check carefully for any other signs of damage.
- **b** Use only tools that are in perfect working order and specially designed for the job; use of inappropriate or ineffective tools may cause serious damage.
- c Perform repairs in clean and, where possible, dust-free areas. Protect all the clearances of connection points with suitable plastic caps and cover the machined surface areas of all parts stripped down until they are put back on the pump again.
- **d** Always check the lubricant and that it is properly distributed through the pump; inadequate lubrication may damage the pump seriously.
- **e** Give the parts some form of marking as you strip them down to ensure that you reassemble them again in the proper order.
- f Check that there are no scratches or grooves on the machined shafts, in their seats inside the pump or on machine-ground surfaces. Slight scratches and abrasions may be eliminated with very fine emery paper or by a little light grinding.
- **g** Before putting a group together, always spread a little oil over inner parts and mating surfaces. Replace all seals with original spare parts before reassembling components.

### **Maintenance Actions**

Maintenance may be seen as the totality of all scheduled and unscheduled maintenance work.

 SCHEDULED MAINTENANCE: Maintaining the nominal state of operation.

#### Tab. 2

Oil level checking	Daily (before every starting)
Oil change	8.000 hours (light applications)
Exhaust filter replacement	If oil mist at exhaust or yearly
Fan cover cleaning	6 months

 UNSCHEDULED MAINTENANCE: Restoring the nominal state of operation.

#### NOTE

The frequency with which repairs are performed depends on the process and presence of substances that shorten pump life (dust, abrasives, solvents, water, chemically aggressive substances).

The pump must be cleaned at regular intervals of time.

#### CAUTION!

Do not clean with Alcohol the plastic or rubber components of the pump.

Use only the strictly necessary amount of lubricant; an excess of lubricating oil, like when there is none, may sometimes compromise proper operation of the pump.

Only the recommended lubricants, or lubricating oils with similar characteristics and known and experimented quality, should be used. Oil changes must be made with the oil at a sufficiently high temperature, after leaving the pump to cool for a few minutes following operation.

The drain and filler plugs must not be left open any longer than is strictly necessary. When performing maintenance, look out for all signals that may precede a breakdown, in particular:

traces of corrosion;

- oil leaks:
- slack joints or couplings.

#### Maintenance technicians must:

- be aware of all applicable national directives concerning accident prevention during work on motor-driven pumps and should know how to apply them;
- have read and understood all the sections on "Safety Rules";
- be familiar with the essential design features and operation of the pump;
- know how to use and consult the pump documentation;
- be concerned about proper operation of the pump;
- make a note of any irregularities in operation of the pump and take the necessary action, where appropriate.

Use original spare parts wherever possible and repair a broken part as best as possible on site or send it back to the manufacturer for repairs. For all problems arising, or to order spare parts, refer to our service department.

Agilent Technologies Italia S.p.A. Vacuum Products Division Via F.lli Varian 54 10040 Leini, (Torino) - Italy Tel.: +39 011 997 9111 Fax: +39 011 997 9350

Toll-Free: 00 800 234 234 00

### Lubricants

The recommended lubricating oil is the Agilent Rotary Vane Fluid DS45 Type. The Rotary Vane Fluid DS45 Type is a general purpose mechanical pump fluid specifically engineered to provide superior performance in high speed direct drive mechanical pumps.

These precisely distilled fluids (100 % solvent refined neutral paraffinic oil) deliver lower base pressure capability, faster pumpdown cycles, and reduced maintenance requirements on both the pump and the fluid.

It is absolutely necessary to continue using the lubricants initially used to fill the tank. If this is not possible for organizational or business reasons, use only products with the same characteristics as the previous oils.

Only use of lubricants of suitable quality will guarantee safe operation of the pumps.

### CAUTION!

Mineral oils and the PFPE oil are incompatible. To change from one type to another, the pump must be stripped down completely and all parts washed carefully to eliminate all oil residues.

If you expect to have to use other lubricants, first find out if the two products are compatible. In cases of doubt, the lubricant used up to that time must be flushed out by way of a pump flushing procedure.

### CAUTION!

To avoid the risk of contaminating the oil, absolute cleanliness of the pump and surrounding area must be ensured during the lubrication procedures.

## **Pump Electronic Controller**

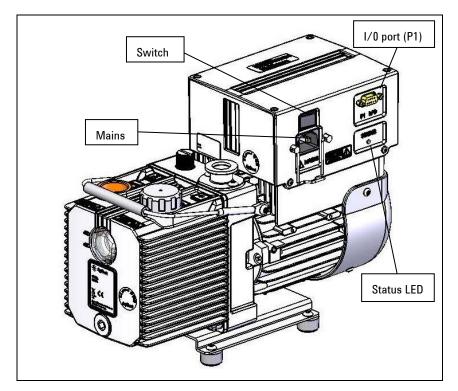


Figure 6

### **Technical Specifications**

- Input voltage: 100V-240Vac ±10%, 50/60 Hz
- Max input power:
  - 100 Vac, 3.05 Aac /305VA 221W
  - 240 Vac, 1.34Aac / 331Va 215/W
- Output voltage: 240 Vrms 3ph;
- Max frequency: 100 Hz (factory setting)
- Starting phase maximum power: 200 W (max 30 minutes)

### 3 Technical Information Pump Electronic Controller

- Normal Operation maximum power: 150 W
- Maximum room temperature: 40 °C
- Protection level: IP 20
- Touch current: ca. 1.1 mA (264Vac, 60 H, 150 W @ 100 Hz)
- Inrush current:
  - 120Vac, 20A
  - 240Vac, 40A
- CE mark:

Tab. 3

EN61326-1 2006 Elctrical equipmnt for measurement control and laboratory use EMC Requirements

Emission Class « A » -10dB

Immunity industrial levels according to Tab. 2

EN61000-4-2

EN61000-4-3

EN61000-4-11

EN61000-4-12

EN61010-1

EN61000-4-6

CSA mark:

EN61000-4-5

• EN61010-1, 2001 (Safety requirements for electrical equipment for measurement control laboratory use)

NOTE

Before connecting the IEC320 mains cable, install the Retention Spring provided with the DS42 Inverter Rotary Vane Pump. The Retention Spring has to be fastened to IEC320 connector lateral screws.

NOTE

Use the Retention Spring to secure the mains cable into the IEC320 socket.

## P1 - I/0: Analog signals + RS232 in one port

Tab. 4

PIN N.	SIGNAL NAME	IN / OUT
1	Interlock. Status (N.O. relay contact)	out
2	TX (RS232)	
3	RX (RS232)	
4	Spare	
5	GND	
6	Interlock. Status (N.O. relay contact)	out
7	Low speed	in
8	Start / Stop	in
9	24V	out

- Interlock: N.O. Relay contact It is closed as soon as the rotational frequency exceed the threshold defined with window no.102 (plus histerisys defined by window 105). Factory set 62 Hz.
- Start/stop: If the inverter is managed by remote port it manages the pump starting. Connect it to +24V (pin 9) to start the pump.
- Low speed: If the inverter is managed by remote port it set the pump low speed. When it is left open (or tied to GND) the frequency setting is HIGH SPEED, if it is connected to +24V (pin 9) the frequency setting is LOW SPEED.

The controller inputs are 0..24V active high. To activate the input related functionally it should be tied to 24Vdc (pin )), a non active state could be obtained either leaving the input not connected or connecting it to GND.

When active, it sources a current less of equal to 6 mA.

■ Active state: Vinput ≥ 12V or Isink≥ 1.6 mA

Non acctive state: Vinput ≤ 4V or Isink≤ 0.1 mA

### 3 Technical Information Pump Electronic Controller

Here below there is a typical connection of trhe input to an external system output.

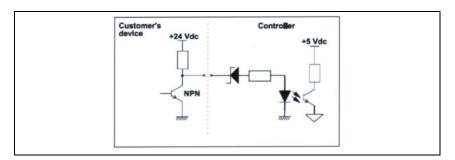


Figure 7

NOTE

The pump operation is I/O signals dependent so you must always plug-in the provided mating connector to start the pump.

# Procedure to connect the I/O port to an external cable

The following picture shows the right procedure to connect a cable to the I/O port connector.

A shielded cable of 30~m maximum length has to be utilized for both serial and I/O port connection.

NOTE

Take care to have a good contact (soldered) between the metallic connector case and the external shield of the cable. Moreover, this connection has to be assured at least on the controller side.

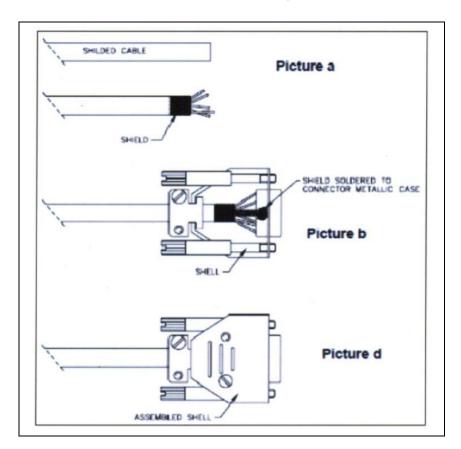


Figure 8

## **RS 232 Communication Description**

The RS 232 interface is available on the P1 I/O connector.

### **Communication Format**

- 8 data bit
- no parity
- 1 stop bit
- baud rate: 600/1200/2400/4800/9600/19200/38400
   programmable

### **Communication Protocol**

The communication protocol is a MASTER/SLAVE type where:

- Host = MASTER
- Controller = SLAVE

The communication is performed in the following way:

- the host (MASTER) send a MESSAGE + CRC to the controller (SLAVE);
- 2. the controller answer with an ANSWER + CRC to the host.

The MESSAGE is a string with the following format:

Where:

NOTE

When a data is indicated between two quotes ('...') it means that the indicated data is the corresponding ASCII character.

- $\langle STX \rangle$  (Start of transmission) = 0x02
- $\langle ADDR \rangle$  (Unit address) = 0x80 (for RS 232)

- <WIN> (Window) = a string of 3 numeric character indicating the window number (from '000' to '999'); for the meaning of each window see the relevant paragraph.
- <COM> (Command) = 0x30 to read the window, 0x31 to write into the window
- <DATA> = an alphanumeric ASCII string with the data to be written into the window. In case of a reading command this field is not present.

The field length is variable according to the data type as per the following table:

Tab. 5

Data Type	Field Length	Valid Characters
Logic (L)	1	'0' = OFF '1' = ON
Numeric (N)	6	'-', '.', '0' '9' right justified with '0'
Alphanumeric (A)	10	from blank to '_' (ASCII)

- $\langle ETX \rangle$  (End of transmission) = 0x03
- <CRC> = XOR of all characters subsequent to <STX> and including the <ETX> terminator. The value is hexadecimal coded and indicated by two ASCII character.

The addressed SLAVE will respond with an ANSWER whose structure depends from the MESSAGE type. When the MESSAGE is a reading command, the SLAVE will respond transmitting a string with the same structure of the MESSAGE.

### 3 Technical Information RS 232 Communication Description

The controller can answers with the following response types:

Tab. 6

Туре	Length	Value	Description
Logic	1 byte	-	after a read instruction of a logic window
Numeric	6 bytes	-	after a read instruction of a numeric window
Alphanumeric	10 bytes	-	after a read instruction of an alphanumeric window
ACK	1 byte	(0x6)	the command execution has been successfully completed
NACK	1 byte	(0x15)	the command execution has been failed
Unknown Window	1 byte	(0x32)	the specified window in the command is not a valid window
Data Type Error	1 byte	(0x33)	the data type specified in the command (Logic, Numeric or Alphanumeric) is not accorded with the specified Window
Out of Range	1 byte	(0x34)	the value expressed during a write command is out of the range value of the specified window
Win Disabled	1 byte	(0x35)	the specified window is Read Only or temporarily disabled (for example you can't write the Soft Start when the Pump is running)

## **Examples**

**Command: START** 

Source: PC

Destination: Pump

02	80	30	30	30	31	31	03	42	33
STX	ADDR	V	IND0	W	WR	ON	ETX	CF	RC

Source: Pump Destination: PC

02	80	06	03	38	35
STX	ADDR	ACK	ETX	CRO	,

**Command: STOP** 

Source: PC

Destination: Pump

02		80	30	30	30	31	30	03	42	32
ST	Κ	ADDR	WIN	1D0M	I	WR	OFF	ETX	CRC	;

Source: Pump Destination: PC

02	80	06	03	38	35
STX	ADDR	ACK	ETX	CRC	;

### **Command: READ PUMP STATUS**

Source: PC

Destination: Pump (with address = 3)

02	83	32	30	35	30	03	38	37
STX	ADDR	W	INDO	W	RD	ETX	CI	RC

Source: Pump (with address = 3 in stop status)

Destination: PC

02	83	32	30	35	30	30	30	30	30	30	03	38	37
STX	ADDR	W	'INDO	W		DA	ATA (S	STATU	IS)		ETX	CF	RC

## Window Meanings

Tab. 7

WIN	TYPE	R/W	DESCRIPTION
000	L	RW	START/STOP (1= START ; 0= STOP)
001	L	RW	LOW SPEED COMMAND (1=0n; 0=0ff)
800	L	RW	REMOTE/SERIAL CONFIGURATION (1= Remote ; 0= Serial)
102	N	RW	SET POINT VALUE [Hz] (0 – 124)
105	N	RW	SET POINT HYSTERESIS [%] (0 – 100)
108	N	RW	BAUD RATE (0-6) [600, 1200, 2400, 4200, 9600, 19200, 38400]
117	N	RW	LOW SPEED ADJUST [Hz] (62 – 100)
120	N	RW	ROTATIONAL FREQUENCY SETTING [Hz] (62 - 100)
127	N	R	ROTATIONAL FREQUENCY SETTING [rpm] (read only)
200	N	R	BUS CURRENT [mA]
201	N	R	3PHASE VOLTAGE [Vrms]
202	N	R	POWER [W]
203	N	R	DRIVING FREQUENCY [Hz]
205	N	R	STATUS (0=stop; 1=wait interlock; 2=start; 3=autotuning; 5=normal; 6=fail)
206	N	R	ERROR CODE: Bit 7: Rotor blocked; Bit 6: shortcircuit; Bit 5: Vdc Overvoltage; Bit 4:Motor overtemp; Bit 3: Too long starting; Bit 2: Controller IGBT; Bit 1: Vdc Undervoltage; Bit 0: overcurrent
211	N	R	HEATSINK TEMPERATURE [°C]
216	N	R	CONTROLLER TEMPERATURE [°C]
234	N	R	BUS VOLTAGE [V]
300	N	R	CYCLE TIME [min]
301	N	R	CYCLE NUMBER
302	N	R	PUMP LIFE [h]
307	N	R	TIME CONTROLLER STAND BY
319	Α	RW	CONTROLLER MODEL NUMBER
320	Α	RW	PUMP MODEL NUMBER
321	Α	RW	PUMP SPECIAL MODEL NUMBER

 WIN	TYPE	R/W	DESCRIPTION
322	Α	RW	PUMP SERIAL NUMBER
323	Α	RW	CONTROLLER SERIAL NUMBER
362	N	R	LAST HOUR AVERAGE PUMP TEMPERATURE [°C]
363	N	R	LAST HOUR AVERAGE CURRENT [°C]
364	N	R	LAST HOUR AVERAGE POWER [W]
365	N	R	LAST HOUR AVERAGE FREQUENCY [Hz]
382	N	R	AVERAGE PUMP TEMPERATURE [°C]
384	N	R	AVERAGE POWER [W]
400	Α	R	PROGRAM LISTING CRC
402	Α	R	PARAMETER LISTING CRC
406	Α	R	PROGRAM LISTING CODE & REVISION
407	Α	R	PARAMETER LISTING CODE & REVISION
	•	· <b>-</b>	

## **Operational Limits**

Tab. 8

INPUT VOLTAGE (V)	CONTROLLER STATUS
< 90	Power fail
90 - 264	Operative
> 264	Power fail

## **Status LED**

Tab. 9

LED STATUS	CONTROLLER STATUS
Green blinking (once every 2 seconds)	Stop
Green blinking	Ramp – Autotuning
Green	Normal Operation
Red	Fail

NOTE

When you switch the controller on an electronic self-test is performed, during such phase you'll see the led Orange for 1 sec. and turned off for two other seconds.

## **Electronic Self-Test**

When you switch the pump on with the main On/Off switch the pump doesn't start immediately but it starts only after about two seconds.

This test time isn't required if the pump is already powered as when it is operated in remote or serial mode.

## **Rotor Lock Test**

The rotational frequency is checked continuously. If the rotor remains still for more than 20 sec. the pump status is changed to "Fail".

## **Accessories**

Tab. 10

PART NUMBER	DESCRIPTION
949-9305M001	MS40+ Exhaust filter
G3870-60000	DS 42 3PH I/O cable

3 Technical Information Accessories



### Vacuum Products Division

Dear Customer,

Thank you for purchasing an Agilent vacuum product. At Agilent Vacuum Products Division we make every effort to ensure that you will be satisfied with the product and/or service you have purchased.

As part of our Continuous Improvement effort, we ask that you report to us any problem you may have had with the purchase or operation of our products. On the back side you find a Corrective Action request form that you may fill out in the first part and return to us.

This form is intended to supplement normal lines of communications and to resolve problems that existing systems are not addressing in an adequate or timely manner.

Upon receipt of your Corrective Action Request we will determine the Root Cause of the problem and take the necessary actions to eliminate it. You will be contacted by one of our employees who will review the problem with you and update you, with the second part of the same form, on our actions.

Your business is very important to us. Please, take the time and let us know how we can improve.

Sincerely.

Giampaolo LEVI

Vice President and General Manager Agilent Vacuum Products Division

### **CUSTOMER REQUEST FOR CORRECTIVE / PREVENTIVE / IMPROVEMENT ACTION**

AGILENT VACUUM PRODUCTS DIVISION TORINO – QUALITY ASSURANCE

TO:

FAX N°:

XXXX-011-9979350

ADDRESS:	SS: AGILENT TECHNOLOGIES ITALIA S.p.A. – Vacuum Products Division –			
	Via F.lli Varian, 54 – :	10040 Leinì (TO) — Italy		
E-MAIL:	AIL: vpd-qualityassurance_pdl-ext@agilent.com			
NAME		COMPANY		FUNCTION
ADDRESS:				
		5.A.V.A.V.O		_
TEL. N° :		FAX N° :		
E-MAIL:				
PROBLEM / S	UGGESTION :			
DEFEDENCE IN	UEODNAATION (m. a.da.l			and the fact was a fine a tended better
etc.):	NFORMATION (model	n°, serial n°, ordering in	formation, ti	me to failure after installation,
				NATE
			ι	DATE
	ACTION PLAN / ACTU	ATION	L	OG N°
(by AGILENT \	VPD)			





# Vacuum Products Division Instructions for returning products

#### Dear Customer:

Please follow these instructions whenever one of our products needs to be returned.

- Complete the attached Request for Return form and send it to Agilent Technologies (see below), taking particular care to identify all products that have pumped or been exposed to any toxic or hazardous materials.
- After evaluating the information, Agilent Technologies will provide you with a Return Authorization (RA) number via email or fax, as requested.

**Note**: Depending on the type of return, a Purchase Order may be required at the time the Request for Return is submitted. We will quote any necessary services (evaluation, repair, special cleaning, eg).

- 3) Important steps for the shipment of returning product:
  - Remove all accessories from the core product (e.g. inlet screens, vent valves).
  - · Prior to shipment, drain any oils or other liquids, purge or flush all gasses, and wipe off any excess residue.
  - If ordering an Advance Exchange product, please use the packaging from the Advance Exchange to return the defective product.
  - Seal the product in a plastic bag, and package product carefully to avoid damage in transit. You are responsible for loss or damage in transit.
  - Agilent Technologies is not responsible for returning customer provided packaging or containers.
  - Clearly label package with RA number. Using the shipping label provided will ensure the proper address and RA number
    are on the package. Packages shipped to Agilent without a RA clearly written on the outside cannot be accepted and will
    be returned.
- 4) Return only products for which the RA was issued.
- 5) Product being returned under a RA must be received within 15 business days.
- 6) Ship to the location specified on the printable label, which will be sent, along with the RA number, as soon as we have received all of the required information. Customer is responsible for freight charges on returning product.
- Return shipments must comply with all applicable Shipping Regulations (IATA, DOT, etc.) and carrier requirements.

#### RETURN THE COMPLETED **REQUEST FOR RETURN** FORM TO YOUR NEAREST LOCATION:

EUKUPE:	NURTH AMERICA:	PACIFIC KIIVI:
Fax: 00 39 011 9979 330		
Fax Free: 00 800 345 345 00	Fax: 1 781 860 9252	please visit our website for individual
Toll Free: 00 800 234 234 00	Toll Free: 800 882 7426, Option 3	office information
vpt-customercare@agilent.com	vpl-ra@agilent.com	http://www.agilent.com



### Vacuum Products Division Request for Return Form (Health and Safety Certification)

Please read important policy information on Page 3 that applies to all returns.

1) CUSTOMER INFORM	IATION				
Company Name:			Contact Name:		
Tel: Email:		Fax:			
Customer Ship To:			Customer Bill To:		
Europe only: VAT r	eg. Number:		USA/Canada only: Taxab	e Non-taxable	
2) PRODUCT IDENTIFIC	ATION				
Product Description	Agilent	P/N	Agilent S/N	Original Purchasing Reference	
	I		1		
3) TYPE OF RETURN (	choose one from each r	ow and supply Purcl	nase Order if requesting a billable	service)	
3A. Non-Billable	Billable	New P0 # (hard	copy must be submitted with this	s form):	
<b>3B</b> . Exchange	Repair Upgrade	Consignment/	Demo Calibration Eval	uation Return for Credit	
4) UFALTU   104FFT					
4) HEALTH and SAFETY		ANY PRODUCTS CO	ONTAMINATED WITH BIOLOGICA	AL OR EXPLOSIVE HAZARDS	
	RIAL, OR MERCURY AT		NIAMINATED WITH DIOLOGICA	AL ON EXPEOSIVE HAZARDS,	
Call Agilent Technol	ogies to discuss alterna	tives if this require	ment presents a problem.		
The equipment listed	above (check one):				
			or hazardous materials. OR		
_		•	oxic or hazardous materials. If this box is checked, the following s for all materials to which product(s) pumped or was exposed:		
Toxic \( \square\)	Corrosive React				
List all toxic/hazard	ous materials. Include ¡	product name, chem	nical name, and chemical symbol	or formula:	
	-			the customer will be held responsible for all	
costs incurred to ensure the safe handling of the product, and <b>is liable</b> for any harm exposure to toxic or hazardous materials present in the product.			rm or injury to Agilent employees as well	as to any third party occurring as a result of	
Print Name:		uthorized Signature	:	Date:	
5) FAILURE INFORMAT	ION:				
Failure Mode (REQUI	Failure Mode (REQUIRED FIELD. See next page for suggestions of failure terms):				
Detailed Description of Malfunction: (Please provide the error message)					
Application (system and model):					
Application (system)	ina modelj.				
I understand and agr	ee to the terms of Secti	on 6, Page 3/3.			
Print Name:	Α	uthorized Signature	·	Date:	



### Vacuum Products Division **Request for Return Form** (Health and Safety Certification)

#### Please use these Failure Mode to describe the concern about the product on Page 2.

#### TURBO PUMPS and TURBO CONTROLLERS

APPARENT DEFECT/MALFUNCTI	ON	POSITION	PARAMETERS	
- Does not start	- Noise	- Vertical	Power:	Rotational Speed:
- Does not spin freely	- Vibrations	-Horizontal	Current:	Inlet Pressure:
- Does not reach full speed	-Leak	-Upside-down	Temp 1:	Foreline Pressure:
- Mechanical Contact	-Overtemperature	-Other:	Temp 2:	Purge flow:
- Cooling defective	-Clogging		OPERATING TIME:	

#### ION PUMPS/CONTROLLERS

- Bad feedthrough	- Poor vacuum
- Vacuum leak	- High voltage problem
- Error code on display	- Other

- Main seal leak	- Bellows leak
- Solenoid failure	- Damaged flange
- Damaged sealing area	-Other

#### **LEAK DETECTORS**

- Cannot calibrate	-No zero/high backround
- Vacuum system unstable	- Cannot reach test mode
- Failed to start	- Other

#### **INSTRUMENTS**

VALVES/COMPONENTS

- Gauge tube not working	- Display problem
- Communication failure	- Degas not working
- Error code on display	- Other

#### **SCROLL AND ROTARY VANE PUMPS**

- Pump doesn't start	- Noisy pump (describe)
- Doesn't reach vacuum	- Over temperature
- Pump seized	- Other

#### **DIFFUSION PUMPS**

- Heater failure	<ul> <li>Electrical problem</li> </ul>
- Doesn't reach vacuum	- Cooling coil damage
- Vacuum leak	- Other

#### Section 6) ADDITIONAL TERMS

### Please read the terms and conditions below as they apply to all returns and are in addition to the Agilent Technologies Vacuum Product Division – Products and Services Terms of Sale.

- Customer is responsible for the freight charges for the returning product. Return shipments must comply with all applicable Shipping Regulations (IATA, DOT, etc.) and carrier requirements.
- Customers receiving an Advance Exchange product agree to return the defective, rebuildable part to Agilent Technologies within 15 business days. Failure to do so, or returning a non-rebuildable part (crashed), will result in an invoice for the non-returned/non-rebuildable part.
- Returns for credit toward the purchase of new or refurbished Products are subject to prior Agilent approval and may incur a restocking fee. Please reference the original purchase order number.
- Units returned for evaluation will be evaluated, and a quote for repair will be issued. If you choose to have the unit repaired, the cost of the evaluation will be deducted from the final repair pricing. A Purchase Order for the final repair price should be issued within 3 weeks of quotation date. Units without a Purchase Order for repair will be returned to the customer, and the evaluation fee will be invoiced.
- A Special Cleaning fee will apply to all exposed products per Section 4 of this document.
- If requesting a calibration service, units must be functionally capable of being calibrated.

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